In the claims:

Following is a complete set of claims as amended with this Response.

1. (Currently Amended) A method of performing a longest match search comprising:

receiving a search key, including an address;

retrieving an encoded mask vector from a mask table, the encoded mask vector corresponding to an address of the search key;

determining a set of masks using the encoded mask vector that when applied to the search key are known to have a potential for matching an entry in a routing table;

forming a routing table query based upon the search key and a ~~longest~~ mask of the set of masks, indicated by the encoded mask vector to be the longest mask of the set of masks; and

applying the routing table query to the routing table.

2. (Original) The method of claim 1, further comprising:

removing the longest mask from the set of masks; and

continuing to apply additional routing table queries until either the set of masks is empty or a matching entry is found in the routing table.

3. (Currently Amended) The method of claim 1, wherein the search key address comprises an Internet Protocol (IP) address.

4. (Original) The method of claim 3, wherein the IP address comprises a destination address.

5. (Original) The method of claim 3, wherein the IP address comprises a source address.

6. (Currently Amended) The method of claim 1, wherein ~~said determining a set of masks comprises retrieving an encoded mask vector from a mask table based upon the search key,~~ the encoded mask vector has ~~having~~ N bits and is capable of identifying N different length masks.

7. (Original) The method of claim 1, wherein the longest mask of the set of masks is determined by the following equation: Mask = (0 – MaskWord) | MaskWord,

where:

MaskWord is an encoded mask vector, and

Mask is the longest mask identified by MaskWord.

8. (Currently Amended) A packet forwarding device comprising:

a plurality of ports upon which packets are received and transmitted, the packets including an address;

a routing processor coupled to the plurality of ports to determine an egress port of the plurality of ports for a packet received on an ingress port of the plurality of ports by performing a longest match search comprising one or more routing table queries, the routing table queries being based on the packet address and a mask indicated by an encoded mask vector of a mask table to be the longest mask of a set of masks determined using the encoded mask vector;

a routing table, coupled to the routing processor, to provide the routing processor with a match indication and information regarding a matching routing table entry, if any, of a plurality of routing table entries stored therein in response to a routing table query; and

a mask table, coupled to the routing processor, to maintain encoded mask vectors corresponding to packet addresses, the encoded mask vectors identifying mask lengths of the plurality of routing table entries.

9. (Previously Presented) The packet forwarding device of claim 8, wherein the encoded mask vectors comprise N-bits and are capable of representing N different masks.

10. (Original) The packet forwarding device of claim 8, wherein the routing table comprises a Content Addressable Memory (CAM).

11. (Original) The packet forwarding device of claim 8, wherein the one or more routing table queries are formed by applying a series of masks determined with reference to the mask table to a search key extracted from the received packet.

12. (Original) A method of forwarding a packet comprising:

receiving a packet on an ingress port of a plurality of ports;

extracting a destination Internet Protocol (IP) address from a header of the packet;

using a portion of the destination IP address to index into a mask table to retrieve an encoded mask vector that identifies a serics of masks to be applied to the destination IP address during a longest match search of a routing table, the series of masks representing those masks that are known to have a potential for matching an entry in the routing table when applied to the destination IP address;

identifying a longest matching entry in the routing table by performing the longest match search based upon the destination IP address and one or more of the series of masks; and

forwarding the packet to a network device associated with the destination IP address via an egress port of the plurality of ports identified by the longest matching entry.

13. (Original) The method of claim 12, whercin the portion of the destination IP address comprises the most significant N bits of the destination IP address.

14. (Original) The method of claim 12, wherein the encoded mask vector includes a plurality of mask length indicator bits that each indicate a mask length by virtue of their position within the encoded mask vector.

15. (Original) The method of claim 12, further comprising updating the mask table to include a new encoded mask vector in response to receiving a new routing table entry.

16. (Currently Amended) A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions which, when executed by a processor, cause the processor to:

receive a search key, including an address;

retrieve an encoded mask vector from a mask table, the encoded mask vector corresponding to an address of the search key;

determine a set of masks using an encoded mask vector that when applied to the search key are known to have a potential for matching an entry in a routing table;

form a routing table query based upon the search key and a ~~longest~~ mask of the set of masks, indicated by the encoded mask vector to be the longest mask of the set of masks; and

apply the routing table query to the routing table.

17. (Original) The machine-readable medium of claim 16, wherein the longest mask of the set of masks is determined by the following equation: Mask = (0 – MaskWord) | MaskWord,

where:

MaskWord is an encoded mask vector, and

Mask is the longest mask identified by MaskWord.

18. (Currently Amended) The machine-readable medium of claim 16, wherein ~~the set of masks is determined by retrieving an encoded mask vector from a mask table based upon the search key,~~ the encoded mask vector has ~~having~~ N bits and is capable of identifying N different length masks.

19. (Previously Presented) A method of forwarding a packet comprising the steps of:

a step for receiving a packet on an ingress port of a plurality of ports;

a step for extracting an Internet Protocol (IP) address from a header of the packet;

a step for using a portion of the IP address to index into a mask table to retrieve an encoded mask vector that identifies a series of masks to be applied to the IP address during a longest match search of a routing table, the series of masks representing those masks that are known to have a potential for matching an entry in the routing table when applied to the IP address;

a step for identifying a longest matching entry in the routing table by performing the longest match search based upon the IP address and one or more of the series of masks; and

a step for forwarding the packet to a network device based upon the longest matching entry.

20. (Previously Presented) The method of claim 19, wherein the IP address comprises a destination IP address.

21. (Previously Presented) The method of claim 19, wherein the IP address comprises a source IP address.

22. (Previously Presented) The method of claim 19, wherein the encoded mask vector includes a plurality of mask length indicator bits that each indicate a mask length by virtue of their position within the encoded mask vector.

23. (Currently Amended) A method of performing a longest match search comprising the steps of:

a step for receiving a search key, including an address;

retrieving an encoded mask vector from a mask table, the encoded mask vector corresponding to an address of the search key;

a determination step for determining a set of masks using the encoded mask vector that when applied to the search key are known to have a potential for matching an entry in a routing table;

a step for forming a routing table query based upon the search key and a ~~longest~~ mask of the set of masks, indicated by the encoded mask vector to be the longest mask of the set of masks; and

a step for applying the routing table query to the routing table.

24. (Previously Presented) The method of claim 23, further comprising the steps of:

a step for removing the longest mask from the set of masks; and

a step for continuing to apply additional routing table queries until either the set of masks is empty or a matching entry is found in the routing table.

25. (Previously Presented) The method of claim 23, wherein the search key address comprises an Internet Protocol (IP) address.

26. (Currently Amended) The method of claim 23, wherein ~~said determination step comprises retrieving an encoded mask vector from a mask table based~~

~~upon the search key,~~ the encoded mask vector has ~~having~~ N bits and is capable of identifying N different length masks.

27. (Currently Amended) The method of claim 23 ~~1~~, wherein the longest mask of the set of masks is determined by the following equation: Mask = (0 – MaskWord) | MaskWord,

where:

MaskWord comprises an encoded mask vector, and

Mask comprises the longest mask identified by MaskWord.

28. (Currently Amended) The method of claim 27 ~~7~~, further comprising:

isolating an endbit of the longest mask;

combining the longest mask with the inversion of the longest mask left-shifted one position; and

forming a subsequent routing table query based on the masked search key left-shifted one position and the endbit.

29. (Currently Amended) A packet forwarding device comprising:

a plurality of interface means for receiving and transmitting packets, the packets including an address;

routing processor means, coupled to the plurality of interface means, for determining an egress interface of the plurality of interface means for a packet received on an ingress interface of the plurality of interface means by performing a longest match search comprising one or more routing table queries, the routing table queries being based on the packet address and a mask indicated by an encoded mask vector of a mask table to be the longest mask of a set of masks determined using the encoded mask vector;

a routing table means, coupled to the routing processor means, for providing the routing processor means with a match indication and information regarding a matching routing table entry, if any, of a plurality of routing table entries stored therein in response to a routing table query; and

a mask table means, coupled to the routing processor means, for maintaining encoded mask vectors corresponding to packet addresses, the encoded mask vectors identifying mask lengths of the plurality of routing table entries.

30. (Previously Presented) The packet forwarding device of claim 29, wherein the encoded mask vectors comprise N-bits and are capable of representing N different masks.

31. (Previously Presented) The packet forwarding device of claim 30, wherein the routing table means comprises a Content Addressable Memory (CAM).

32. (Previously Presented) The packet forwarding device of claim 30, wherein the one or more routing table queries are formed by applying a series of masks determined with reference to the mask table means to a search key extracted from the received packet.